

3 June 74

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STATE MESSAGE

ACTION UNIT

FILE NR 0015033 STATSPEC

ACTION #

OPR CRW 004 INDICO

T 160211

EIA034

PAGE 01

TOR:031942Z JUN 74

DCI BCI2 NC 48159

P 031536Z JUN 74  
FM AMEMBASSY MOSCOW  
TO SECSTATE WASHDC PRIORITY 9384  
BT  
UNCLAS MOSCOW 8345  
FOR SCI  
E.O. 11652: N/A  
TAGS: TGEN OTRA UR US  
SUBJ: US-USSR S&T AGREEMENT: MICROBIOLOGY WORKING GROUP  
REF: A. STATE 10010; B. STATE 114949  
1. EMBASSY MAY 31 RECEIVED SHENDERREY-LEISE LETTER WITH COMPOSITION OF SOVIET DELEGATION AND SOVIET PROGRAM REQUESTS.  
2. SOVIET GROUP WILL BE AS FOLLOWS:  
YE. SHENDERREY, HEAD OF DELEGATION;  
I. BEREZIN, MOSCOW STATE UNIVERSITY;  
SH. YENIKEYEV, KAZAN TECHNOLOGICAL INSTITUTE;  
V. SEREGIN, GLAVMIKROBIOOPROM;  
V. SUKHODOLETS, ALL-UNION SCI-RES. INST. OF GENETICS;  
L. MEL'NIKOV, ALL-UNION SCI.- RES. INST. OF PROTEIN SYNTHESIS.  
3. DELEGATION WILL ARRIVE JUNE 9 FOR NINE-DAY VISIT.  
4. DELEGATION WISHES TO VISIT FOLLOWING COMPANIES AND INSTITUTIONS AND REQUESTS US SIDE'S ASSISTANCE IN ARRANGING VISITS:  
USDA AGRICULTURAL RESEARCH STATION, BELTSVILLE;  
ROCKEFELLER UNIVERSITY, LABORATORY OF DRS. HOTCHKISS, TATUM AND SCOTT;  
NEW YORK UNIVERSITY, LABORATORY OF DR. MOSS;  
CORNING GLASS WORKS, NEW YORK;  
PFEISER CORP., NEW YORK;  
EXXON CORP., LINDEN, NEW JERSEY;  
WASHINGTON (WORTHINGTON?) BIOCHEMICAL CORP;  
FERMENTATION PLANT, NEW JERSEY;  
MERCK CORP., RAHWAY, NEW JERSEY;  
GULF OIL, PITTSBURGH, PILOT AND SEMI-INDUSTRIAL FACILITIES FOR PROTEIN PRODUCTION;  
UNIVERSITY OF PITTSBURGH, LABORATORY OF DR. L. VINGARD;  
INSTITUTE OF GAS TECHNOLOGY, CHICAGO, FACILITIES FOR OBTAINING PROTEIN FROM GAS;

LOS MES  
FV - T-16  
SOS  
MICROBIOLOGY

Microbiology

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PAGE 02-02

NC 48159

TOR:231942Z JUN 74

NORTHERN ILLINOIS GAS COMPANY, CHICAGO;  
KANSAS STATE UNIVERSITY, KANSAS CITY;

M.I.T.;

GENERAL ELECTRIC CO., NEW YORK, FACILITIES FOR OBTAINING PROTEIN  
FROM SECONDARY RAW MATERIALS.

5. SOVIET SIDE AGREES TO HOLDING JOINT MEETING JUNE 10-12  
DURING WHICH TIME BASIC DOCUMENTS OF MEETING COULD BE  
WORKED OUT AND AGREED UPON. FOLLOWING JOINT MEETING,  
DELEGATION WISHES TO VISIT ABOVE FIRMS AND LABORATORIES  
AND ANTICIPATES THE US SIDE'S ASSISTANCE IN ARRANGING THESE  
VISITS.

6. SINCE RECEIPT OF ABOVE INFORMATION, EMBASSY HAD RE-  
CEIVED REF. B CONTAINING TENTATIVE PROGRAM FOR DELEGATION.  
AS THIS PROGRAM DIFFERS FROM THAT PROPOSED BY SHENDEREY,  
EMBASSY WILL NOTE, WHEN TRANSMITTING US SUEDE'S PROPOSED  
PROGRAM, THAT TIME LIMITATIONS WILL PROBABLY PRECLUDE  
ARRANGING SPECIFIC PROGRAM DESIRED BY SOVIET SIDE. SCST  
AND SHENDEREY ARE AWARE OF URGENCY WHICH WAS ATTACHED  
TO RECEIVING SOVIET PROPOSALS AT MUCH EARLIER DATE AND  
THEREFORE CANNOT EXPECT TO HAVE THEIR PROPOSALS ACCEPTED  
AT THE VERY LAST MINUTE.

7. PLEASE ADVISE IF PROGRAM IN REF. B WILL BE ALTERED TO  
TAKE INTO ACCOUNT ANY OF THE DIFFERENT SOVIET PROGRAM  
DESIRES. STOESSEL

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To: SCA/VO/SPLX - E. Harris

From: EUR/SES - R. Gordon

EUR/SES recommends issuance of visa(s) to  
the alien(s) listed in para(s) 3 through 8

EUR/SES recommends the admission  
of the alien(s) although name  
checks have not been completed.

*R. Gordon*  
EUR/SES Case Officer

3 June 74  
1. Me MS MES  
2. F+S file

PAGE 01 MOSCOW 08307 031256Z

53

ACTION VOE-00

INFO OCT-01 EUR-06 ISO-00 CIAE-00 FBIE-00 INSE-00 NSAE-00

SCI-06 NSF-04 CU-04 CPR-02 USIE-00 SSO-00 /023 W  
127643

O 031235Z JUN 74  
FM AMEMBASSY MOSCOW  
TO SECSTATE WASHDC IMMEDIATE 9361

UNCLAS MOSCOW 8307

E.O. 11652 N/A

TAGSICVIS UR

SURJ: VISAS: MICROBIOLOGICAL SYNTHESIS WORKING GROUP: SHERENDEREY

1. VISAS DONKEY DOTS CHIPMUNK SPLEX. ETD JUNE 9. STAY 10 DAYS. \*
2. TO PARTICIPATE IN MEETING JOINT AMERICAN-SOVIET WORKING GROUP  
IN SCIENTIFIC COOPERATION IN MICROBIOLOGICAL SYNTHESIS.
3. BEREZIN, ILIYA VASIL'YEVICH, 9 AUG 1923, ASTRAKHAN', DEAN OF  
CHEMICAL FACULTY OF MOSCOW STATE UNIVERSITY.
4. MEL'NIKOV, LEV ALEKSANDROVICH, 6 MARCH 1927, VOLGOGRAD. SR.  
RESEARCHER OF ALL-UNION RESEARCH INST. OF PROTEIN SYNTHESIS OF  
MAIN ADM. OF MICROBIOLOGICAL INDUSTRY OF USSR COUNCIL OF MINISTERS.  
VLOB DPT 1.
5. SEREGIN, VLADIMIR IVANOVICH, 3 OCT 1938, LOPUKHOVKA. DEPUTY  
CHIEF OF TECHNICAL ADM. OF MAIN ADM. OF MICROBIOLOGICAL INDUSTRY  
OF USSR COUNCIL OF MINISTERS.
6. SHERENDEREY, YEVGENIY ROMANOVICH, 27 JULY 1927, KOMMUNARSK.  
DEPUTY CHIEF OF MAIN ADM. OF MICROBIOLOGICAL INDUSTRY OF USSR  
COUNCIL OF MINISTERS.
7. SUKHOOLETS, VITALIY VLADIMIROVICH, 1927, LOPUKHOVKA.  
DEPUTY DIRECTOR OF ALL-UNION RESEARCH INST. OF GENETICS OF MAIN  
ADM. OF MICROBIOLOGICAL INDUSTRY OF USSR COUNCIL OF MINISTERS.



# Department of State

TELEGRAM

UNCLASSIFIED

PAGE 02 MOSCOW 08307 031256Z

B. YENIKEYEV, SHAMILI GARIFOVICH, 25 JUNE 1939, SVERDLOVSK,  
FACULTY MANAGER OF KAZAN CHEMICAL TECHNOLOGICAL INST.  
STOESSEL

**E.O.E.:** New York or Washington

**During:** June/July

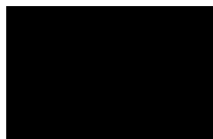
**\*Stay:** 12 days, not 10 days as requested in visa message

**Sponsor:** National Science Foundation - Visit Under US/USSR  
S and T Agreement

**Notes:** Itinerary attached

STATINTL

cc .



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# Department of State

TELETYPE

UNCLASSIFIED 9131

PAGE 01 STATE 114949

72  
ORIGIN SCI-86

INFO OCT-91 EUR-25 ISN-00 NSF-04 EG-11 COME-00 AEC-11 L-20  
CIAE-00 INR-10 NSAF-00 RSC-01 AGR-20 CU-04 7096 R

DRAFTED BY SCI/SA3RJNALD:GEN  
APPROVED BY SCI/SA3OGANLFY  
NSF:JLE100  
EUR/SOV:RPARDON

UNCLASSIFIED

115179

R 312206Z MAY 74  
FM SECSTATE WASHDC  
TO AMEMBASSY MOSCOW

UNCLAS STATE 114949

E.O. 11652: N/A  
TAGS: TGEN, NTRA, UR  
SUBJECT: S&T AGREEMENT: MICROBIOLOGY

REF: MOSCOW 7650

FOR SCICONS

1. FOLLOWING IS BRIEF OUTLINE OF TENTATIVE ITINERARY FOR  
SOVDEL VISIT: FINAL ARRANGEMENTS NOW IN PROGRESS:

SUNDAY, JUNE 9 - ARRIVE JFK, NEW YORK  
- FLY TO WASHINGTON, D.C.

JUNE 10 (MIDDAY) THROUGH JUNE 12 - MEETING OF JOINT  
- WORKING GROUP

JUNE 13 - MORNING - VISIT BELTSVILLE (USDA)  
- AFTERNOON - FLY TO PHILADELPHIA

JUNE 14 - MORNING - VISIT UNIVERSITY OF PENNSYLVANIA  
- AFTERNOON - VISIT VISITS TO FERMENTATION  
- DESIGN (ALLENTOWN) AND GE



## Department of State

TELETYPE

UNCLASSIFIED

PAGE 02 STATE 114949

- (VALLEY FORGE)  
- EVENING - FLY TO BOSTON  
JUNE 15 - VISIT BRANDEIS UNIVERSITY AND MIT  
- FLY TO NEW ORLEANS  
- JUNE 16 - FREE  
JUNE 17 - VISIT LOUISIANA STATE UNIVERSITY  
- (BATON ROUGE)  
JUNE 18 - FLY TO INDIANAPOLIS  
JUNE 19 - VISIT ELI LILLY  
- FLY TO WASHINGTON, D.C.  
JUNE 20-21 - FINAL DISCUSSIONS AND SIGNING OF RECORD  
JUNE 21 (EVENING) - DEPART WASHINGTON VIA  
- AEROFLOT FOR MOSCOW  
2. SOVDEL SHOULD HAVE OPEN AIR TICKETS AS FOLLOWS:  
NEW YORK-WASHINGTON-PHILADELPHIA-BOSTON-NEW ORLEANS-  
INDIANAPOLIS-WASHINGTON.

CABLE SEC DISSEM BY *45* PER *45*

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*RF* FILE *VB* *OSI/SDUJ* *PS/EGJ*

ACTION #

*CRW*, *03R4*, *0PR2*, *1AS/HRB*, *OSI/STUJ*

*SBZ*, *SS3* *(OLD)* *DDSTZ* *OSG/ST*

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2		5	
3		6	

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PAGE 01-01

STATSPEC

NC 34675

TOR:220149Z MAY 74

R 211707Z MAY 74  
FM AMEMBASSY MOSCOW  
TO SECSTATE WASHDC 9031U

BT

UNCLAS MOSCOW 7660

FOR SC

E.O. 11652: N/A

TAGS: TGEN OTRA UR

SUBJECT: US-USSR S&T AGREEMENT: MICROBIOLOGY

REF: STATE 100010

1. SHENDEREY HAS JUST RETURNED TO MOSCOW FROM BUSINESS TRIP AND EMBASSY HAS BEEN PROMISED HIS SUGGESTIONS ON PROGRAM THIS WEEK. WE POINTED OUT THAT IT MAY ALREADY BE TOO LATE FOR THE US SIDE TO TAKE HIS PROPOSALS INTO ACCOUNT IN ARRANGING PROGRAM DUE TO SHORTNESS OF TIME REMAINING BEFORE GROUP'S ARRIVAL.

2. SOVIET DELEGATION WILL CONSIST OF SIX INDIVIDUALS: SHENDEREY, YENIKEYEV, MELNIKOV, BEREZIN, SUKHODOLEV AND SEREGIN. FULL NAMES AND TITLES ARE TO BE SUPPLIED WHEN PROGRAM SUGGESTIONS DELIVERED, STOESSEL

*DESMOS*  
*175-710*

--

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NATIONAL SCIENCE FOUNDATION

WASHINGTON, D.C. 20550

STATINTL

Deputy Minister E. R. Shenderey  
Ministry of Microbiological Industry  
U.S.S.R. Council of Ministers  
Lesteva 18  
Moscow, U.S.S.R.

Dear Dr. Shenderey:

You should, by now, have received our suggested dates for the next meeting of the Joint Working Group and copies of the Working Plans proposed by the Project Coordinators on the U.S. side. We would suggest that the efforts of this next joint meeting be focussed on developing our working plans, setting our project priorities, developing our plan of action for 1974-1975, and agreeing to the details of our future cooperative efforts. (Since we have sent you our Working Plans, we are looking forward to receiving your Working Plans shortly, so that we may be able to review them when the U.S. side meets in the middle of April.)

We would propose to begin the Joint Working Group meeting in the afternoon on Monday of the week of your visit. The afternoon portion could be taken up with introductions, agreeing on an agenda, and having our various project coordinators meet to develop individual project plans. On Tuesday, we would begin formal deliberations. We would hope that by Wednesday afternoon we would have reached a mutual understanding on the text of the record of our joint meeting. Following the completion of the work of the Working Group, your delegation would visit various U.S. laboratories and companies. (A suggested itinerary of such visits will be sent to you shortly.) Then, if necessary, we would meet again before your departure for the signing of the record of our meeting with its associated recommendations to the Joint Commission. I trust this meets with your approval, and we look forward to a prompt reply.

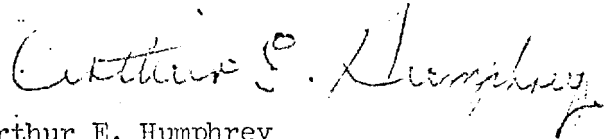
Now that the U.S. Working Group is in the phase of proposing grants to the U.S. Government, and since Dr. Humphrey may be receiving such grants, it was his suggestion that he step aside in favor of a Government employee.

Dr. Stever, U.S. Chairman of the Joint Commission, agreed with Dr. Humphrey, and has appointed him as Co-Chairman; and me as Chairman. Dr. Humphrey will, of course, continue to serve as the U.S. Working Group Coordinator for Instrumentation and Modelling.

Sincerely yours,



Joshua M. Leise  
Chairman, U.S. Side of the  
Joint Working Group on Production of  
Substances by Microbial Means



Arthur E. Humphrey  
Co-Chairman, U.S. Side of the  
Joint Working Group on Production of  
Substances by Microbial Means

NSF:JML:ld

5/5 - Received American Embassy  
5/9 - Received Department of State

To Mr. M. Leize  
President of the American  
Part of the Joint Working  
Group for Scientific-Tech-  
nical Cooperation in the  
Area of Obtaining Substances  
by Microbiological Means.

SVT Bld

STATINTL

Comment! By  
3 June  
Ray

Dear Dr. Leize,

Allow me to congratulate you in connection with your appointment by the manager of the American part of the joint working group for scientific-technical cooperation in the area of obtaining substances by a microbiological method and to express assurance in the rapid accomplishment of the preparatory segment of cooperation and its future development.

We have received your proposals relating to the deadlines for carrying out the third session of the joint working group and considering your proposals, we plan to be in the United States from 9- 12 of June, 1974 in order to complete the work of the joint working group and then to begin actuating the program by visiting laboratories and U.S. companies; and likewise, in the event that we need to meet again in order to sign the protocol and make recommendations of the joint commission.

As concerns the projects of the cooperative working programs, they will be sent in the near future.

Taking this opportunity, I ask you to pass on to Professor Humphrey our gratitude for the large amount of work which he has performed as President of the American part of the joint Soviet-American working group.

With best regards,

E. Shenderoy

President of the Soviet part  
of the working group

## WORKING PROGRAM

Topic 1: "Development of Technology for Industrial Production and Utilization of Food and Food Proteins by Microbial Means, Including Research Into Different Aspects of Toxicity and Biological Value of Such Products"

for 1974-1977

Coordinators: Dr. Gregorian (USSR)  
Dr. Daniel I.C. Wang (USA)

Name of Topic and Divisions	Participants		Duration of task		Forms of Cooperation	Results of Work
	USSR	USA				
1	2	3	4	5	6	

I. Assortment and selection of microorganisms of active rich protein producers by the amino acid content for nutrients and food

1974-77

I.I Selection of bacteria and yeast cultures

Inst. of Biochem. & Physiol. al Res. Moscow St. Labs Univ. MIT  
Inst. of Protein Synthesis

Exchange of strains

Obtaining highly productive industrial strains

1	2	3	4	5	6
Development of a method for comparative evaluation of strains among them					
I.2 Study of possible ways for regulating direct biosynthesis of proteins in order to raise the content of irreplaceable amino acids (methionine, cystine, tryptophan, lysine)	Inst. Biochem & Phys. of Micro-organisms Inst. of Protein Synthesis	North. Region Res. Labs MIT	1974-77	Exchange of information Joint research	Devel. of methods for selecting strains by raising content of irreplaceable amino acids (1974-75) Devel. of methods of direct synthesis (1976-77)
2. Techno-economical comparison of various kinds of raw materials for micro-biological synthesis with econ. analysis			1974-76		
2.1 Cultivation of yeast cultures on molasses, ethanol, methanol, hydrocarbon with removal of prognostic techno-econ. characteristics	Inst. of Protein Synthesis	MIT U. Penn.		Exchange of information	Obtaining technical and economical characteristics of technological processes 1976

1	2	3	4	5	6
2.2 Cultivation of bacteria on methanol, ethanol, gas-forming and liquid hydrocarbons of a paraffin line, agricultural and industrial refuse, with removal of techno-econ. characteristics	Inst. of Biochem. & Phys. of Microorganisms Inst. of Protein Synthesis	U. of Missouri	Exchange of information	Obtaining technical and economical characteristics of technological process (1976)	
2.3 Comparative evaluation of basic characteristics and choice of substrates	Inst. of Protein Synthesis	MIT U. Penn U. Mis- souri	1st stage =1974-75 2nd stage =1976	exchange of info.	1. Devel. of methods of comparative techno-econ. level-1974 2. Prognostic comparison of techno-econ. analysis for determining raw materials 1st stage- 1974-75 (theor.) 2nd stage- 1976 (specific)
3. Methods of improving separation of protein substances from biomass of a single cell organism					

1	2	3	4	5	6
3.1. Devel. of enzymatic & mechanical methods of protein release	INEOS Inst. of Protein Synthesis	MIT	1974-76	exchange of information execution of joint research	Establish technical and economical feasibility for industrial use
3.2 Release of microbe biomass from protein release - with aid of enzymes - by physical-chemical means	Inst. of Protein Synthesis	MIT	1974-76	exchange of information	Determination and selection of fermentors; devel., and analysis of technological progress- 1975.
4. Devel. of industrial methods for obtaining protein from single-cell microorganisms					Establishment of technical and economical feasibility for industrial use
4.1 Apparatus for Cultivation	Inst. of Biotech. Inst. of Protein Synthesis	MIT	1974-76	exchange of information	joint report on projects of industrial enzymes
4.2 Separation of biomass	(same as above)	MIT	1974-76	exchange of information	same as 4.1

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## 4.3 Purifying and Drying

same as 4.I

exchange of information

1974-76

Inst. of U. of  
Protein Min-  
Synthesis nesota  
Inst. of  
Biotech.

4.4 Devel. of apparatus  
for increasing power of  
purifying biomass

same as 4.I

exchange of information

1974-76

same as  
above

5. Specialized processing  
of biomass and separation  
of protein nutrients from  
it

Devel. of process

exchange of information

1975-77

INEOS MIT  
Inst. of U. of  
Protein Minnesota  
Synthesis  
Acad. of  
Sci.-Nutri-  
tion Institute

6. Biological value and  
harmlessness of single-  
cell proteins

Devel. of unified  
methods for determining  
biological value and  
harmlessness

exchange of information

1974-77

MIT  
Acad. of Sci.-  
Nutrition Inst.  
USSR



PROJECT 2

## WORKING PROGRAM

ENGINEERING RESEARCH AND DEVELOPMENT OF EQUIPMENT FOR THE  
COMPUTERIZED SIMULATION, DESIGN AND CONTROL OF PROCESSES  
FOR MICROBIAL TECHNOLOGY

Dr. Arthur Humphrey  
Univ. of Penn. - USA  
Coordinators: Sh. Yenikev-Kazan  
Inst. of Chem. Tech. USSR

No.	Name of topic and divisions	Participants USSR	USA	Duration of task	Forms of Cooperation	Expected results
1	2	3	4	5	6	7
I.	Development of methods and new sensors for measuring the significant variables in microbial processes.					
I.1	Joint working conference for developing recommendations for direct research in area of developing sensors	Kazan Inst. of Chemical Tech. (KICT) Inst. of Biotech.	U. of Penn.	one week spring-1975 5 participants ea. from USSR & USA	Conference at U. of Penn.	Devel. of general report with recommendations for direct research in area of processing new sensors.
I.2	Creation of means for controlled measuring of bio-masses (incl. interphase & mathematical guarantee)	KICT Inst. of Biotech.	U. of Penn.	2 yrs. 1975-77	exchange of scientific reports; exchange of 2 collaborators per yr. from ea. country	Devel. of technological documentation and equipment

1	2	3	4	5	6	7
1.3	Creation of means for controlled measuring activity of microorganisms (incl. interphase & math. guarantee)	KICT Inst. of Biotech.	U. of Penn.	3 yrs.	same as 1.2	same as 1.2
1.4	Creation of means for controlled measuring tech. for measuring cultural environment (incl. interphase and math. guarantee)	KICT Inst. of Biotech.	U. of Penn.	same as 1.2	same as 1.2	same as 1.2
2.	Investigation of processes of mass momentum and heat transfer in heterogeneous gas-liquid-liquid type of cultural condition, and also kinetics and biochemical mechanisms of hydrocarbon uptake by microorganisms.					
2.1	Conference on mechanism of hydrocarbon uptake by microorganism and hydrodynamic theory of cultural environment	KICT Inst. of Protein Synthesis Inst. of Biotech.	U. of Kansas	1 week summer-1975	Conference at Inst. of Protein Synthesis Moscow; 5 participants from ea. country	Devel. of general report on research conditions in this area and delivery of recommendations in directive research.

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2.2	Devel. of experimental apparatus & completing research in kinetic and biochem. mechanisms of hydrocarbon uptake by microorganisms	Inst. of Protein Synthesis KICT	U. of Penn. U. of Kansas	2 yrs. 1975-77	Exchange of scientific reports; exchange of 2 collaborators per yr. from ea. country	Devel. of theory and obtaining of experimental information for processing mathematical simulation for biochemical kinetic uptake of hydrocarbons
2.3	Devel. of hydrodynamic theory of heterogeneous microbial systems of the gas-liquid-liquid type	KICT	U. of Kansas	2 yrs. 1975-77	exchange of sci. reports; exchange of 1 scientific collaborator ea. yr. from ea. country	Devel. of mathematical simulation for procedure of heterogeneous cultural environment
2.4	Devel. of experimental apparatus and obtaining data for creation of hydrodynamic simulation of heterogeneous fermentation in gas-liquid-liquid system	KICT Inst. of Biotech. Inst. of Protein Synthesis	U. of Kansas U. of Penn.	2 yrs. 1975-77	exchange of sci. reports; exchange of 2 scientific collaborators from each country	Experimental data necessary for mathematical simulation of cultural environment

1 2 3 4 5 6 7

## 3 Research on population dynamics of microorganisms

- 3.1 Conference on specific direct-ives for theoretical and experimental work  
KICT Inst.of Biotech.  
U.of Kansas  
1 week fall, 1975  
Conference at U.of Kansas; 5 participants ea. from USSR and USA  
Summarized report on the problem
- 3.2 Devel. of structural theory and population dynamics in uninterupted fermentation  
KICT  
U.of Kansas  
2 yrs. 1975-77  
exchange of sci. reports; exchange of 1 scientific collaborator from each country  
Devel. of math. simulation of population dynamics of microorganisms
- 3.3 Devel. of experimental equipment and obtaining data to create models of population dynamics of microorganisms  
KICT Inst.of Biotech.  
U.of Penn. U.of Kansas  
2 yrs. 1975-77  
Exchange of sci. reports; exchange of 2 scientific collaborators each year  
Experimental data for math. simulation of population dynamics of microorganisms

1 2 3 4 5 6 7

4 Development of Engineering Techniques for Optimal Design of Industrial Scale Fermentor and Automatic Control of Industrial Fermentation Processes.

- |     |   |  |  |                            |   |   |
|-----|---|--|--|----------------------------|---|---|
| 4.1 | <p>Conference on summarized results of topics 1,2,3 according to these aspects:</p> <ol style="list-style-type: none"> <li>1. theory &amp; math. simulation of fermentation process of hydrocarbons</li> <li>2. Structure of demonstrated system of fermentation, controlled by computer</li> </ol> | <p>KICT<br/>Inst. of Biotech.<br/>Inst. of Protein Synthesis</p> | <p>U. of Penn.<br/>U. of Kansas<br/>MIT<br/>New Brunswick Scientific</p> | <p>1 month summer-1977</p> | <p>Conference at Inst. of Protein Synthesis; 10 participants from ea. country</p>     | <p>Summarized report on research results of topics 1,2,3; Tech. task on project of demonstrating fermentation systems, controlled by computer</p> |
| 4.2 | <p>Development and Research of math. simulation on fermentation process of hydrocarbons</p>   | <p>KICT<br/>Inst. of Biotech.</p>                                | <p>U. of Penn.<br/>MIT<br/>U. of Kansas</p>                              | <p>1 yr. 1977-78</p>       | <p>exchange of research results exchange of 2 sci. collaborators from ea. country</p> | <p>Devel. of math. simulation applicable for optimal construction; automatic management of fermentation process on hydrocarbons</p>               |

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- 4.3 Devel. of En-  
gineering tech-  
niques for opti-  
mal constructing  
of industrial  
scale fermentor  
protein  
Synthesis
- U. of Penn.  
U. of Kansas
- 1 yr.  
1978-79
- Exchange of  
research results  
exchange of 2 sci.  
collaborators from  
ea. country
- Devel. of opti-  
mal constructing  
of industrial  
scale fermentor  
of single-cell  
proteins from  
hydrocarbons
- 4.4 Devel. of auto-  
matic techniques  
for controlling  
industrial fer-  
mentation processes  
with computer  
control
- U. of Penn.  
MIT
- 1 yr.  
1978-79
- Exchange of  
research results  
exchange of 2 sci.  
collaborators from  
ea. country
- Math. guarantee  
for computer-  
controlled fer-  
mentation processes
5. Design and Structure of a Practical System for Controlling Fermentation  
Process in order to produce Single-Cell Protein from Hydrocarbons.
- 5.1 Conference on  
coordination  
of project work
- U. of Penn.  
MIT  
New Brunswick  
Scientific
- 2 weeks  
spring 1978
- Conference at New  
Brunswick Scienti-  
fic Farm
- Specification of  
technical task on  
the design and devel-  
opment of equip-  
ment; de-  
cisions on organi-  
zational questions

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- 5.2 Design, Preparation and Assembly of Fermentor, computer controlled
- KICT  
Inst. of Biotech.  
Inst. of Protein Synthesis
- New Brunswick Scientific  
MIT  
U. of Penn.
- 2 yrs.  
1978-80
- Exchange of visits for consultations on design and construction of apparatuses
- optimally designed fermentor with computer control
- 5.3 Demonstration in USSR of optimal management process for obtaining single-cell protein with aid of a computer
- KICT  
Inst. of Biotech.  
Inst. of Protein Synthesis
- New Brunswick Scientific  
U. of Penn.  
MIT
- a month  
summer, 1980
- lectures by leading developers
- optimal processes for obtaining single-cell protein from hydrocarbons.
6. Joint Writing and Publishing of Book on Simulation, Design and Control of Fermentation Systems with the Aid of a Computer
- 6.1 Meeting to discuss plans of book
- Yenikeyev  
KICT  
Inst. of Biotech.
- Humphrey  
U. of Penn.
- spring, 1975, during meeting on topic 1.1
- agreement on composition by all authors
- annotations and plan of book by chapters

	1	2	3	4	5	6	7
6.2		Writing of Separate Chapters	authors	authors	3 yrs. 1975-78	exchange of chapters and critical analysis	manuscript of book
6.3		Editing and Publishing of book	Yenikeyev KICT	Humphrey U. of Penn.	1 yr. 1978-79	editing book in Russian and English	jointly pub- lished book



## WORKING PROGRAM NO. 3

## MOLECULAR BIOLOGY OF INDUSTRIAL ORGANISMS

Coordinators: S. Alikhanian (USSR), H. Halvorson and V. Brown (USA)

No.	Name of topic and divisions	PARTICIPANTS		Duration of task	Forms of Cooperation	Expected Results
		USSR	USA			
1	2	3	4	5	6	7
I.	Development of genetic methods for improving industrial microorganisms based on approaches of molecular biology			1975-78		
I.1.	Conference on new techniques for selecting industrial organisms	Inst. of Genetics	Brandeis U. Squibbs, Inc.	1975 5 days	Conference in USA; 5 participants from ea. country	Exchange of information
I.2	Development of program of joint research on genetic engineering	Inst. of Biochem. & Physiology (Acad. of Sciences) Inst. of Genetics	Stanford U.	1975-76 3-4 days	Conference in USA; 5 participants from USSR	Exchange of information
I.3	Development of techniques for improving activity of fermentor-producers on model of microorganisms decomposing cellulose	Inst. of Genetics	Laboratory in Natick, Mass.	1975-76	exchange of information and strains	Improving productivity of strains & producers of cellulose

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6

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4

3

2

1

1974-78

2 Development of techniques for genetic analysis of microorganisms for insect control

2.1 Development of joint research programs

Inst. of Genetics

Northern Regional Labs in Peoria, Ill. U. of Wisc. U. of Mich.

Conference in USA; 5 Soviets and 20 Americans

Exchange of information

2.2 Genetic study of toxin forming processes and spore formations by Bacillus thuringiensis

Inst. of Genetics

Northern Regional Labs in Peoria, Ill.

joint research exchange of scientists

Increasing productivity of strain by toxin formation

2.3 Development of methods of genetic analysis based on the study of interrelations

Inst. of Genetics

Brandeis U.

joint research exchange of scientists

Development of methods of genetic analysis of Bacillus with use of viruses =

1975-78

3 Development of genetic methods for improving industrial strains utilizing hydrocarbons, oil, methanol, and other sources of raw materials

1	2	3	4	5	6	7
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- |     |  |                                   |                      |  |   |
|-----|--|-----------------------------------|----------------------|--|---|
| 3.1 | Development of joint research programs on hydrocarbon utilization of yeasts  | Leningrad State Univ. at Berkeley | U. of Calif. 1975    | Conference in Leningrad; 5 US participants and 10 from USSR                        | Exchange of information   |
| 3.2 | Study of genetic control systems on uptake of hydrocarbons of yeasts   | Inst. of Genetics                 | U. of Calif. 1975-78 | Devel. of joint program; exchange of information & strains; exchange of scientists | Improvement of technical properties of industrial strains               |
| 3.3 | Study of mutability and genetic control of productive traits (composition of biomass, separation of organic acids, etc.) | Inst. of Genetics                 | U. of Calif. 1975-78 | Devel. of joint programs; joint publications; exchange of scientists               | Determination of perspective directions in selecting industrial strains |
| 4   | Development of techniques of genetic analysis and micro-organism-producers of amino acids and various metabolites        |                                   | 1975-77              |  |   |

1	2	3	4	5	6	7
4.1	Development of genetic methods for creating strains for amino acids and other products of microbial synthesis	Inst. of Genetics	U. of Chicago	1975-77	Joint research exchange of scientists	Creation of new methods of genetic strains and various metabolites
5	Conference on results of cooperative program full-filaments	Inst. of Genetics	Brandeis U.	1979	Conference in USA or USSR	Publication of book according to results of conference

## WORKING PROGRAM

## PROJECT 4 : "Development of Ways to Produce and Apply Enzymes for Industrial and Analytical Goals"

for 1974-1980

Coordinators: I. Berezin, K. Kalunyants (USSR); G.T. Tsao (USA)

No.	Working task, topic	Organizations-Participants		Duration of task	Forms of Cooperation	Expected results
		USSR	USA			
1	2	3	4	5	6	7
I.	Search and obtaining of strains of microorganisms producing determinant enzyme systems, including systems categorized by hydrolysis, glycoside bonds, oxidation of hydrocarbons; study of conditions instrumental to biosynthesis of maximally possible quantities of enzymes	Inst. of Biotech. at Moscow State Univ.	N.S.F. grantees	1974-80	Joint research program; exchange of strains and information; dev. of united ways of testing; joint symposiums within the program	Finding highly productive strains of microorganisms & devel. of technology
I.1	Selections of microorganisms and enzyme producers	Inst. of Biotech. at Moscow State Univ.	N.S.F. grantees	1974-80	Exchange of strains & their analysis	Finding highly productive strains of microorganisms
I.2	Study of microbial physiology, assortment of culture mediums; devel. of optimal conditions for their cultivation, guaranteeing improvement in biosynthetic activity	Inst. of Biotech. at Moscow State Univ.	N.S.F. grantees	1974-80	Joint research program; exchange of information; joint symposiums within program	Devel. of technology; cultivation guaranteeing maximum biosynthesis of enzymes
2.	Development of methods for preparing and wide-scale separating and purifying of necessary enzymes, including systems categorized by hydrolysis, glycoside bonds and oxidation of hydrocarbons.	Inst. of Biotech. at Moscow State Univ.	N.S.F. grantees	1974-1980	Joint research program; exchange of information; documentation; joint consultations within program	Devel. of effective processes & equip. for processing & separating & purifying enzymes on industrial scale

1	2	3	4	5	6	7
2.1	Determination of optimal conditions for separating enzymes	Inst. of Bio-tech. at Moscow State U.	N.S.F. grantees	1974-80	same as 2	Finding optimal conditions for separating enzymes
2.2	Development of technical process for separating enzymes	same as above	same as above	1974-80	same as 2	Devel. of technology for separating enzymes
2.3	Development of technical process for purifying enzymes	same as above	same as above	1974-80	same as 2	Devel. of technology for purifying enzymes
2.4	Development of methods for stabilizing enzymes	Inst. of Biotechnology	same as above	1974-80	same as 2	Recommendations of ways for stabilizing enzymes
2.5	Design of industrial equipment	Inst. of Bio-technology	same as above	1974-80	same as 2	Devel. of industrial equipment for separating and purifying enzymes
3	Development of methods for obtaining technological production of immobilized enzymes; research on properties of immobilized enzymes	Inst. of Bio-technology at Moscow St. Univ; TPI; Acad. of Sci. USSR	same as above	1974-80	Joint research program; exchange of information & preparations; joint execution of research & consultations, symposiums	Devel. of new ways of enzyme immobilization and industrial processes of their production; creation of theoretical basis of activity of immobilized enzymes

1	2	3	4	5	6	7
3.1	Choice of carriers and methods of immobilizing enzymes	Inst. of Bio-technology Moscow State Univ.; TPI; Acad. of Sci. USSR	NSF grantees	1974-80	same as 3	Choice of optimal carriers and methods of immobilization
3.2	Development of methods for immobilization of multienzymes and/or cofactor systems	Inst. of Bio-technology Moscow State Univ.; Acad. of Sciences, USSR	same as above	1974-80	same as 3	Devel. methods of immobilization of multi-enzymes and/or cofactor systems
3.3	Development of theoretical and experimental processes catalyzed by immobilized enzymes	Inst. of Bio-technology Moscow State Univ.; TPI; Acad. of Sci. USSR	same as above	1974-80	same as 3	Creation of theoretical and experimental processes catalyzed by immobilized enzymes
3.4	Development of technological processes and equipment for producing immobilized enzymes	Inst. of Biotechnology TPI	same as above	1974-80	same as 3	Creation of technology and apparatus for producing immobilized enzymes
4	Diagnostic and Analytical Uses of enzymes; including immobilized enzymes	Moscow State University	same as above	1974-80	Joint research program; exchange of information Joint consultations within program	Devel. new diagnostic & analytical methods
4.1	Enzyme-immunity analysis	Moscow State University	same as above	1974-80	same as above	Creation of methods for enzyme-immunity analysis
4.2	Development of enzyme methods for detecting faint light or sound	Moscow State University	Univ. of Pennsylvania	1974-80	same as above	Creation of light and sound sensitive materials/

1	2	3	4	5	6	7
4.3	Development of enzyme electrodes and methods of analyzing their use	Moscow State University	NSF grantees	1974-80	same as 4	Creation of enzyme-electrodes and analytical methods of their use
5	Creation of scientific bases; devel. of tech. processes and equipment for enzymatic transmutation of substances	Inst. of Biotechnology Moscow State University	same as above	1974-80	Joint research program and exchange of information, documentation and preparations; joint consultations and symposiums within the program	Devel. of new tech. processes and equipment for obtaining enzymes; their use in agriculture
5.1	Production of sugar from cellulose	same as above	Univ. of California at Berkeley	1974-80	same as above	Creation of enzyme catalysts; devel. of tech. and equipment for obtaining sugar from cellulose
5.2	Production of fermentable sugars from starch and agricultural wastes	Inst. of Biotechnology	same as above	1974-80	same as above	Creation of enzyme catalysts; devel. of tech. and equipment
5.3	Enzyme production of milk substitutes	Inst. of Biotechnology	same as above	1974-80	same as above	Creation of enzyme catalysts; devel. of tech. and equipment



1	2	3	4	5	6	7
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5.4	Obtaining of amino acid by enzymatic cleavage of protein waste products	Inst. of Biotech. Moscow St. Univ.; Acad. of Sciences USSR	Coring Glass	1974-80	same as 5	Creation of enzyme catalysts; devel. of tech. and equipment
5.5	Obtaining oxygen-containing products by enzyme oxidation of hydrocarbons	Inst. of Biotechnology Moscow State University	NSF grantees	1974-80	same as 5	Creation of enzyme catalysts; scientific basis for technology

PROJECT 5

## WORKING PROGRAM

MICROBIOLOGICAL CONTROL OF PESTS  
IN AGRICULTURE

Coordinators: O. Alioshina (USSR) and A. Heimpel (USA)

No.	Name of topic and divisions	Participants		Duration Of task	Forms of Cooperation	Expected Results
		USSR	USA			
1	2	3	4	5	6	7
I.	Sporulation of Milky Disease Bacteria	1974-76				
I.1.	Exchange of publications and bacterial cultures	Nat'l. Acad. Cornell Ex- of Science perimental Inst. of Station; Microbiology Agricultural Armenia, SSR Station, Belts- ville, Maryland				
I.2	Development of research plans	same as above	1974 3 days	Meeting in USA; 6-7 par- ticipants from ea. country	Exchange of infor- mation	Establishment of virulent strains for further work

1	2	3	4	5	6	7
2.1	Exchange of cell lines and publications	Inst. of Molecular Genetics Inst. of Bacterial Preparations	Ohio State Univ.; Agricultural St. Beltsville, Maryland	1974-75	meeting in USSR; 6 participants from ea. country	Exchange of information
2.3	Research on problems	same as above	same as above	1974-76	Joint research meeting in USA	Devel. of methods for obtaining & preserving viruses
2.4	Report summary			1976		Recommendations for report summary
3	Development of a Single Standardized System and Evaluation of Bacterial and Virulent Qualities of Entomopathogenic Preparations					
3.1	Research program	Inst. of Microbiology Nat'l. Acad. of Sciences, Armenia, SSR		1975-78	Symposium on methods of standardization USSR-1975 10-12 participants from USSR and 8-10 from USA	Discussion on Standardization methods; selection of optimal method

1	2	3	4	5	6	7
3.2	Execution of research	Inst. of Bacteriological Preparations Inst. of Microbiology Armenia, SSR		1975-77	Exchange of information as a result of research	Joint publication of research results; recommendations for standardized methods of analysis
3.3	Joint verification of recommended methods			1978	Execution of joint verification of recommended methods	Instruction on use of standardized methods